Developing an Interface that Refines the Search for Ephemeris Data Files used in the Interpretation of Spacecraft Science Instrument Data

Research Intern: John Matthew Bulalacao
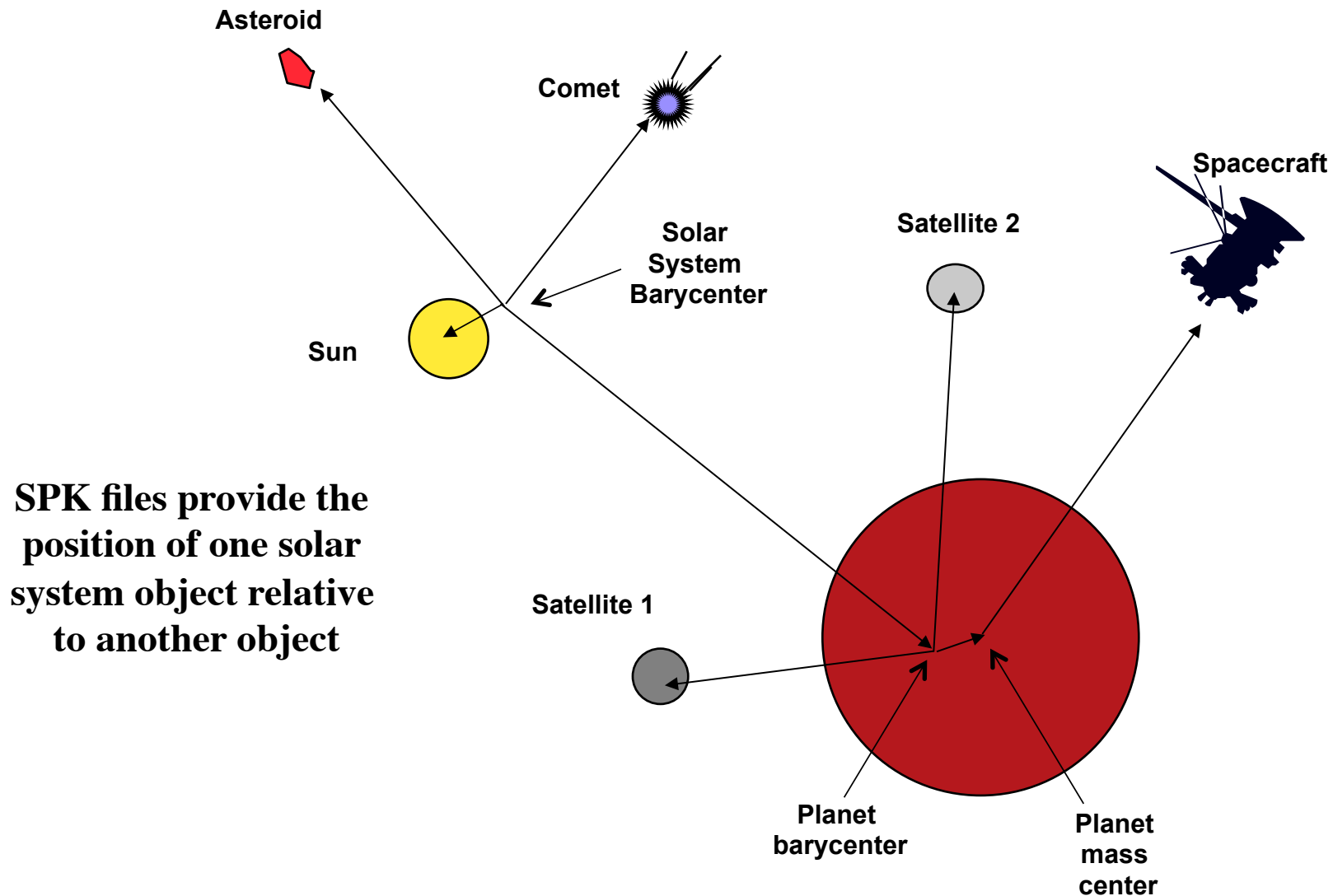
California State Polytechnic University

Pomona, CA
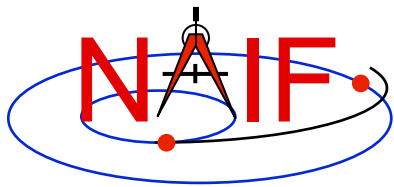
Presentation Outline:

I.   **SPK Intro**

II.   **PDS Interface**

III.   **Multiple SPK Analysis**

IV.   **Single SPK Analysis**

V.   **Current Progress**

VI.   **Future Goals**
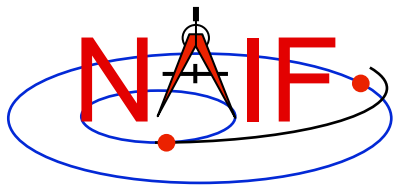
Examples of SPICE Ephemeris Objects in an SPK file

Navigation and Ancillary Information Facility

Asteroid

Comet

Spacecraft

Satellite 2

Solar System Barycenter

Sun

SPK files provide the position of one solar system object relative to another object

Satellite 1

Planet barycenter

Planet mass center

Current Method of Retrieving Mission Archived Kernels Through PDS Interface

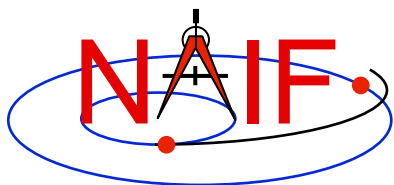**Navigation and Ancillary Information Facility**

This is the PDS web page at which you'll arrive if you click on "PDS Archived SPICE Kernels" on NAIF's "Data" web page:

Select a "Mission," or an "Instrument Host" (they are not always identical).

Select START and STOP dates if desired.
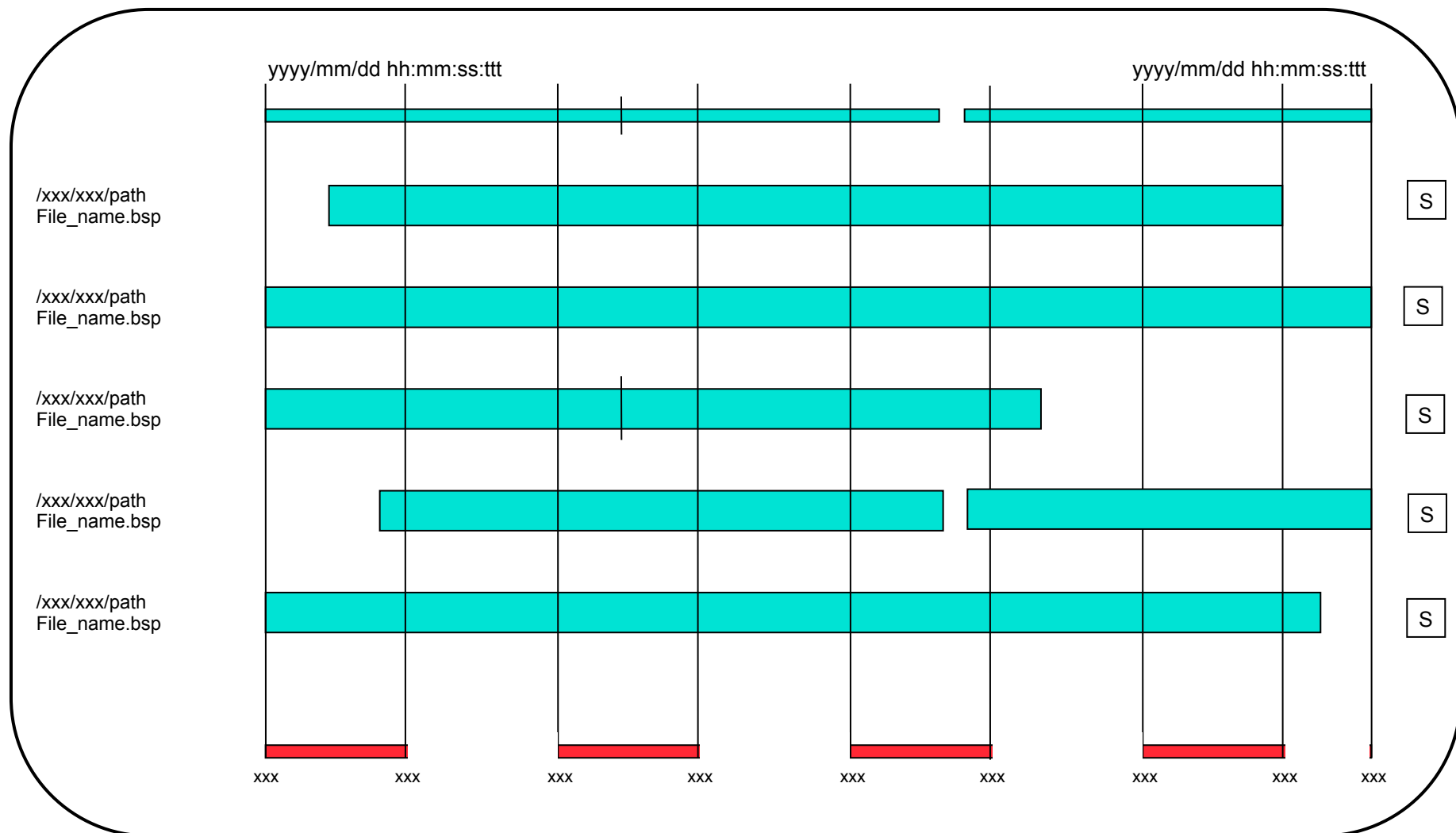
"Spice" data has been pre-selected for you.

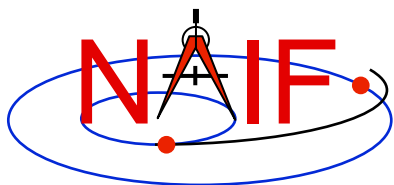Then press "GO" and see what turns up!

Top-level Display
Multiple SPK Files of "Similar" Time Span
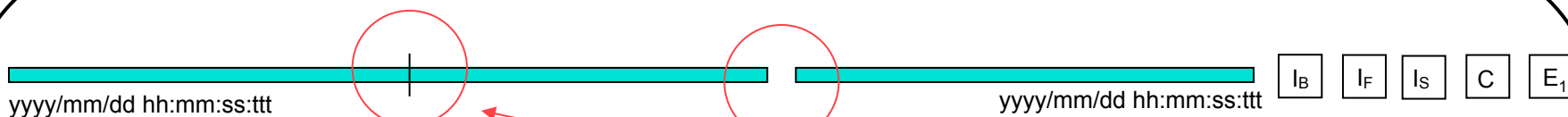
Navigation and Ancillary Information Facility

yyyy/mm/dd hh:mm:ss:ttt   yyyy/mm/dd hh:mm:ss:ttt

/xxx/xxx/path
File_name.bsp   S

/xxx/xxx/path
File_name.bsp   S

/xxx/xxx/path
File_name.bsp   S

/xxx/xxx/path
File_name.bsp   S

/xxx/xxx/path
File_name.bsp   S

xxx   xxx   xxx   xxx   xxx   xxx   xxx   xxx   xxx

Pressing an   S   leads to the page for display of a single SPK file. See two charts later.

Navigation and Ancillary Information Facility

yyyy/mm/dd hh:mm:ss:ttt   yyyy/mm/dd hh:mm:ss:ttt

I_B I_F I_S C E_1

Data gap indicators (for any object, i.e. .OR.)
(what is the tolerance… what epsilon is not a gap?)

File name

Earliest start time: yyyy-mm-ddThh:mm:ss.ttt

Latest stop time: yyyy-mm-ddThh:mm:ss.ttt

Time span: <duration> <units>

Gaps present: nnn   (summed across all objects) Largest: xxx   Smallest: yyy

IDs of centers of motion: <id>, <id>, etc.

Frame names: <name>, <name>, etc.

SPK Types Present: <type>, <type>, etc.

No. of target objects: nnn   **No. of center objects: mmm**

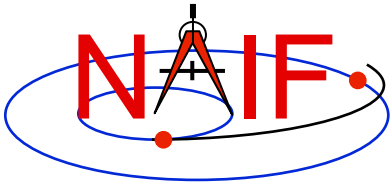   ID of object   NAIF name (if it is known)   ID of object   NAIF name (if it is known)
   ID of object   NAIF name (if it is known)   ID of object   NAIF name (if it is known)
   ID of object   NAIF name (if it is known)   etc.
   ID of object   NAIF name (if it is known)

        etc.

Current Progress

- Analysis of the data within an SPK file and its related support files continues to be conducted; this is an ongoing learning process.

- Establish an understanding of SPK files, their organization, and the useful data contained within them

- Development and Review of Functional Requirements for access to SPK files by our users
  - Establish a real need to create an interface with graphic interpretations of SPK files and the segments contained within them
  - Incorporate recommendations from scientists and engineers who regularly download and utilize SPK files in their research
  - Propose use-case scenarios to refine the process of file selection
  - Proper Documentation of all successes, errors, and shortcomings
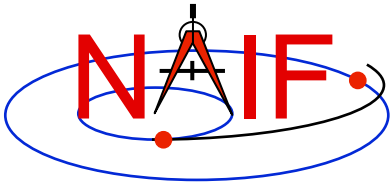
Near-Future Goals

- JAVA, HTML, and PERL are all being researched to not only perform the necessary functions outlined by the project requirements, but are also being investigated for their portability by different operating systems and standard web browsers

- Web Development Software are being considered for methods of database analysis while also being utilized to create several versions of a Web-based interface.

- Criteria are being established to compare the efficiency of the interface and graphical interpretations created by these different methods